

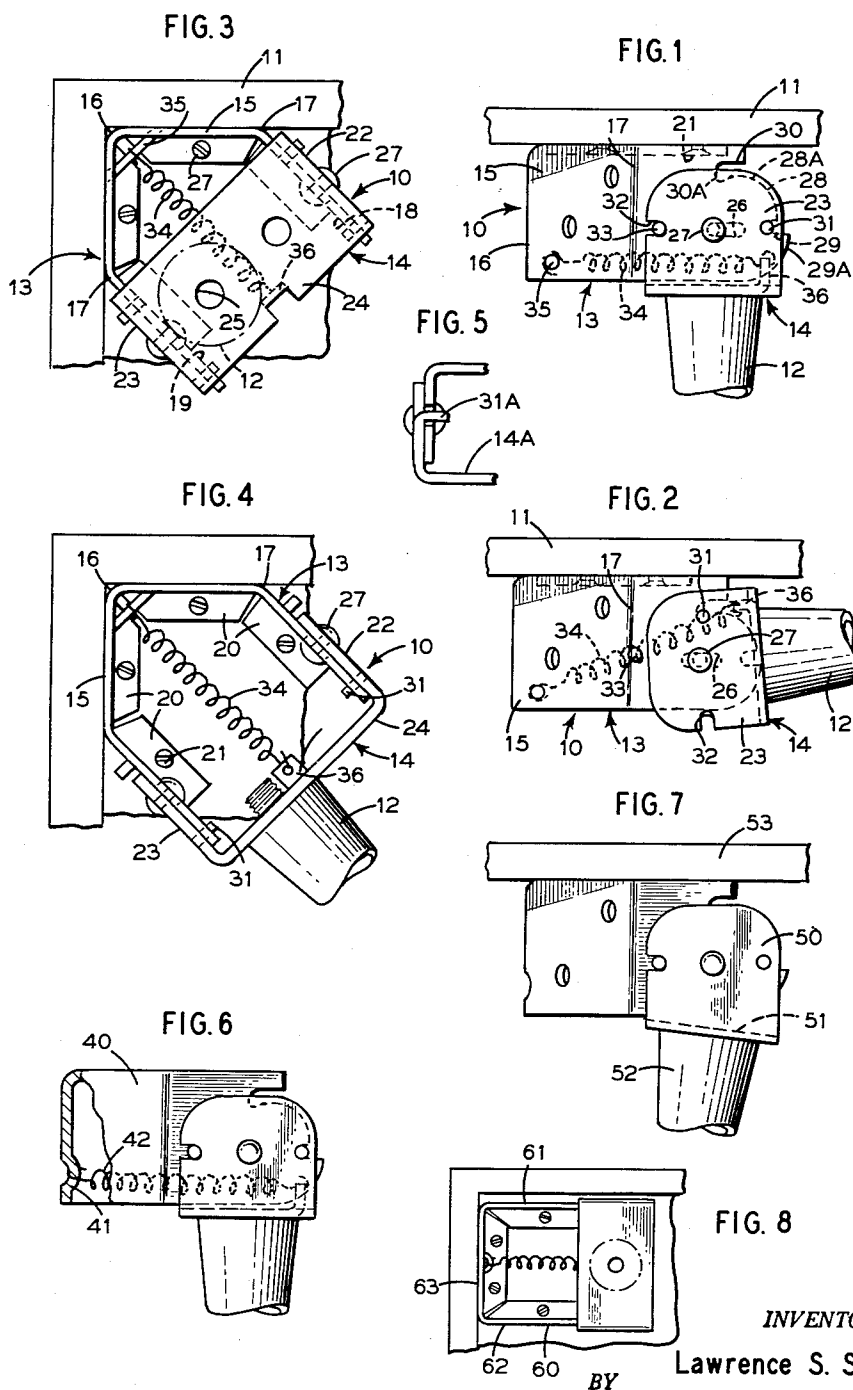
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HINGE CONSTRUCTION FOR USE WITH FOLDABLE TYPE FURNITURE

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HINGE CONSTRUCTION FOR USE WITH FOLDABLE TYPE FURNITURE

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5 Claims. (Cl. 16—190)

This invention relates to an improved hinge construction, and more particularly to a hinge construction adapted for use with foldable type furniture, e.g. a table having foldable or retractable legs.

An object of this invention is to provide an improved hinge construction that is sturdy, easy to operate, and positive in action.

Another object is to provide in an improved hinge construction an arrangement whereby the movable leaf or member thereof is normally urged or biased toward either operative or inoperative position by a toggle spring action.

Another object is to provide for automatically and positively locking of the movable hinge leaf or member in either operative or inoperative position.

A feature of this invention resides in the provision that the improved hinge is relatively simple in construction, jam proof and relatively inexpensive to manufacture.

Still another feature of this invention resides in the provision that the hinge when positively locked in either the operative or inoperative position is readily releasable with little effort.

Other features and advantages will be readily apparent when considered in view of the description and drawings in which:

Fig. 1 is a side elevation view of the improved hinge, as applied to a table, and is shown in the operative or leg protracted position.

Fig. 2 is a side elevation view illustrating the hinge in inoperative position, i.e. the leg retracted or stowed position.

Fig. 3 is a bottom plan view of the hinge illustrated in operative position.

Fig. 4 is a bottom plan view of the hinge shown in inoperative position.

Fig. 5 illustrates a fragmentary modified detail of the hinge illustrated in Figs. 1 to 4.

Fig. 6 illustrates a slightly modified form of the hinge illustrated in operative position.

Fig. 7 illustrates a further modified form of the invention showing an arrangement whereby the leg of a table may be disposed at an oblique angle with respect to the table top.

Fig. 8 is a bottom plan view of still a further modification.

Referring to the drawings, Figs. 1 to 4 illustrate the improved hinge 10 of this invention as applied to a foldable table 11 in which the legs 12 are adapted to fold between retracted or inoperative position of Figs. 2 and 4 and a protracted or operative position as shown in Figs. 1 and 3. In accordance with this invention the improved hinge construction comprises a base member 13 which is adapted to be fixedly attached to the underside of a table 11 and a movable member 14, to which the table leg 12 is secured, pivotally and slidably connected to the base member 13 for movement between operative and inoperative position.

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As shown in Figs. 1 to 4, the base member 13 preferably comprises a plate 15 bent along a bend line 16 to define a 90° or right angle corner with the sides of the angle formed intermediate the ends thereof being again bent along bend line 17 approximately 45° to define a pair of parallel side flanges 18 and 19. As shown in Fig. 1, the upper marginal portion of the base member 13 is inwardly bent to provide a ledge or internal flange 20. The inturned flange 20 is provided with suitable apertures for receiving a fastener 21, such as a screw or the like by which the base is fixedly secured to the underside of a table.

Pivotally mounted to the fixed base member 13 is the movable leaf or member 14 of the hinge. In accordance with this invention the movable member 14 is pivoted to the side flanges 18, 19 by means of a pin and slot connection.

As shown the movable leaf or member 14 comprises a plate having its ends bent at right angles to define a U-shaped member having parallel arm portions 22, 23 and connected web 24, the latter being provided with a threaded opening 25 or the like for receiving leg 12. Preferably the arms 22, 23 of the movable member 14 are disposed so that they overlies the side flanges 18, 19, with the arms pivoted to the flanges so that the movable member 14 may rotate about the ends of the flange for moving the connected leg to either protracted or retracted position.

In the illustrated embodiment the side flanges 18, 19 intermediate the height thereof are each provided with an elongated slot 26 having its major diameter horizontally disposed, and a pin or rivet 27 projecting inwardly of the arms of the movable member 14 adapted to be received in slot 26. Thus it will be noted that the movable member 14 is free to slide relative to said base 13 a limited extent. If desired the members containing the pin and slot, as described, may be reversed without affecting the inventive concept, i.e. the slot 26 may be formed in the arms 22—23 and the pivot pin 27 may project outwardly of flanges 18—19.

In accordance with this invention the upper edge of each flange 18, 19 is formed with a cam surface or edge 28 traversing an arc through substantially 90° and having its radius of curvature centered about pivot pin 27. As shown, a notch 29 and 30 is provided at the extreme limits of the cam 28 to define automatic stops for the movable member in moving about the ends of the flanges 18, 19 between operative and inoperative positions. As shown the notch 29 for limiting the movement of member 14 in operative position has its lower edge 29A extended beyond the curvature of the cam surface 28. The upper notch 30 for limiting the movement of the movable member 14 in inoperative position may be provided with a shallow depression 30A for reasons to be hereinafter described.

In accordance with this invention each of the arms 22, 23 of the movable member 14 is provided with an inwardly projecting pin 31 adjacent an edge portion thereof to form a cam follower adapted to ride on the cam surface 28. Accordingly the cam follower or pin 31 is adapted to engage notch 29 or 30 in either operative or inoperative position to limit the movement and to positively lock the movable member 14 in either position as will be hereinafter described. Diametrically opposite to the cam follower the arms 22, 23 are provided with an inwardly extending notch 32 which is adapted to engage a lock pin 33 in the operative position of the movable member, pin 33 being connected to the outer side of the flanges 18, 19. Preferably the lock pin 33 is disposed in alignment with notch 29 and slot 26.

A feature of this invention resides in the use of a spring means arranged to normally urge the movable

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member 14 into either operative or inoperative position and urging the same into automatically locking position. In accordance with this invention the spring 34 is adapted to function in the nature of a toggle in that the axis of the spring 34 is intended to pass through the transverse axis of pivot pin 27, which may be considered as the dead center of the spring toggle action.

In the illustrated form of Figs. 1 to 4, one end of the coil spring 34 is connected about an anchor pin 35 extended between the side of the base 13 adjacent the apex of the corner angle, and the other end of the spring is connected to a tab 36 bent out of web 24. As shown in Fig. 1, the longitudinal axis of the spring 34 is disposed below the axis of slot 26 and parallel to the bottom of the base 13 when the movable member is in the operative position. In the inoperative position, as shown in Fig. 2, the longitudinal axis of the spring 34 is disposed at an oblique angle relative to the bottom of the base member 13 and disposed on the other or opposite side above the transverse axis of said pivot pin 27.

The operation of the hinge is as follows:

With the hinge in inoperative position, as shown in Figs. 2 and 4, the cam follower 31 is normally urged against the bottom of depression 30A of notch 30 by the action of the spring 34. In this position the leg 12 of table 11 is retracted. To protract the leg 12 a force is applied to the leg to overcome the spring action in a direction so as to rotate member 14 in a clockwise direction about pivot pin 27. In doing so, the cam follower 31 is forced to ride the cam surface 28, the follower 31 first overriding the node 28A of cam 28 to release the member 14 from its positively locked stowed position. Continued applied force in clockwise direction will cause member 14 to rotate, moving web 24 from the vertical position of Fig. 2 to the horizontal position of Fig. 1. In doing so the cam follower 31 riding the cam surface 28 may cause the movable member 14 to slide in pivot slot 26 to the right slightly, as viewed in Figs. 1 and 2. The arrangement is such that as soon as the axis of the spring 34 moves through the transverse axis of the pivot pin 27, the spring action will automatically snap the movable member 14 and connected leg 12 to protracted position. Automatic locking of the leg 12 in protracted position is attained by the alignment of the cam follower 31 with notch 29 and notch 32 with pin 33. With these pins and notches aligned, the spring action, now able to pull horizontally, automatically moves the movable member 14 to the left, as viewed in Fig. 1, to positively lock the movable member in operative position.

To unlock the leg 12 and retract the same, the movable member 14 must be first displaced to the right by a sliding movement, as viewed in Fig. 1, to free the cam follower 31 and pin 33 from their respective notches 29, 32. With the cam follower 31 freed, the leg 12 is retracted by rotation in a counterclockwise direction causing the cam follower 31 to ride the cam 28. As the axis of the spring 34 passes through the transverse axis of the pivot pins 27, the toggle spring action will snap the movable member 14 and connected leg 12 to retracted position. The force of the spring 34 is sufficient to enable the cam follower 31 to override the node 28A whereby the follower 31 is brought up against the stop notch 30. Thus the leg is automatically retained in stowed position.

As shown in Fig. 5, the movable member 14A has been slightly modified. In this form cam follower 31A is formed as an integral tab bent from a cut out portion of the movable member. In all other respects the hinge assembly of Fig. 5 is unchanged from that herein described.

The hinge embodiment of Fig. 6 is similar in all respects to that described with respect to Figs. 1 to 4 with the exception that the base 40 is provided with an apertured dimple 41 and the spring 42 is anchored thereto.

In Fig. 7, the movable member 50 has been slightly

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modified. In this form the web portion 51 of the movable member 50 is provided with an incline or sloping surface so that in the operative position the leg 52 connected thereto is disposed at an oblique angle with respect to the floor and table top 53.

In Fig. 8, the base member 60 has been slightly modified to define a U-shaped base. As shown the base 60 is formed from a plate bent to have parallel leg portions 61, 62 disposed at substantially right angles to a connected web portion 63. In all other respects the structure and operation of the hinge of Fig. 8 is similar to that hereinbefore described with reference to Figs. 1 to 4.

It will be noted that while the drawings illustrate a pointed angular base 13, as in Fig. 1, and a flat or squared angle base 60 configuration, as in Fig. 8, it is to be appreciated that the base may be appropriately shaped to fit a table having any polygonal or round table top, e.g. a triangular, octagonal, circular or oval. Also it is to be noted that if desired the fasteners may be extended through apertures in the upright portions of the base member, as for example through holes (not identified), as shown in Fig. 2, to secure the hinge to a table top; rather than through the inturned flange or ledge 20, as hereinbefore described.

While in accordance with the provisions of the statutes I have illustrated and described herein the best form and mode of operation of the invention now known to me, those skilled in the art will understand that changes may be made in the form of the apparatus disclosed without departing from the spirit of the invention covered by my claims, and that certain features of my invention may sometimes be used to advantage without a corresponding use of other features.

What is claimed is:

1. An improved hinge assembly comprising a base member having integrally connected flange portions, a movable member, said movable member having complementary arm portions, a pin and slot connection pivotally securing the arm portions of said movable member to said flange portions whereby said movable member is pivoted about said pin and slidable in said slot in moving between operative and inoperative positions about the ends of said flange portions, and a spring means having one end connected to said base member and having its other end connected to said movable member, said spring being disposed so that the axis of said spring moves through the axis of said pin and slot connection as the movable member is rotated between operative and inoperative positions for normally urging said movable member into either of said positions, at least one of said flange portions is provided with an arcuate camming edge having a radius of curvature centered about the axis of said pivotal connection, a cam follower connected to the arm of said movable member adapted to ride on the camming edge, and means cooperating with said cam follower for positively locking said movable member in either of said positions.

2. An improved hinge assembly comprising a bent plate defining a base member having a pair of spaced parallel side flanges, a U-shaped movable member having parallel arm portions and an integral connecting web portion, a pin and slot connection pivotally securing the arm portions of said movable member to said side flanges whereby said movable member is rendered movable between operative and inoperative position about the ends of said side flanges, each of said side flanges having an edge portion defining a cam transversing an arc through substantially 90° and having a radius of curvature centered about the axis of said pin connection, a depression extending radially inwardly of said cam at the extreme limits thereof, a cam follower in the form of an inwardly projecting pin connected to the arms of said movable member for riding on said cam, a coil spring having one end connected to said base member and hav-

ings its other end connected to said movable member, said spring being disposed so that the axis of said spring moves through the axis of said pin and slot connection, which is disposed perpendicular thereto, as the movable member is rotated between operative and inoperative position so that said spring normally urges said movable member into either of said positions, and said cam follower being urged into said depressions at the limits of said cam to positively limit and lock said movable member in either of said positions.

3. The invention as defined in claim 2 wherein said pivotal connection includes a slot in each of said side flanges and said slot having its major axis horizontally disposed therein, and a pivot pin fixed to the arms of said movable member projecting through said slot.

4. An improved hinge assembly comprising a bent plate defining a base member having parallel side flanges, said flanges having inwardly turned edge portions, said edge portions being provided with a plurality of apertures adapted to receive fasteners by which the hinge assembly is secured to a furniture piece, a U-shaped movable member having parallel arm portions connected by an integral web, means pivotally connecting the arms of said U-shaped member to said flanges, said pivoting means including an elongated slot having a horizontal axis disposed in each of said side flanges, a pivot pin connected to each of said arms, said pin projecting through said slotted openings whereby said movable member is pivotable about said pin between operative and inoperative position, each of said side flanges having an arcuate cam edge portion traversing an arc through approximately 90°, means forming a positive stop at the extremities of said camming edge, said stop means limiting movement of said movable member in the operative position including a projecting lip and cooperating notch extending radially inwardly of said cam edge, said notch being co-axially disposed with respect to said slot, and a depression at the other extreme limit of said camming edge to limit the movable member in inoperative position, a cam follower connected to said arms for riding on said cam arc, and a coil spring having one end fixed to said base and having its other end fixed to the web of said movable member, said spring being disposed so that the axis of said spring moves through the axis of said pin and slot connection, as the movable member is rotated between operative and in-

operative positions and said spring normally biasing said cam follower into lock position as the movable member reaches the limits of said cam.

5. An improved hinge assembly comprising a bent plate defining a base member having parallel side flanges, said flanges having an inwardly turned edge portion provided with a plurality of apertures adapted to receive fasteners by which the hinge assembly is secured when applied to a furniture piece, a U-shaped member having parallel arm portions connected by an integral web, means pivotally connecting the arms of said U-shaped member to said flanges, said pivoting means including an elongated slot horizontal axis disposed intermediate the height of each side flange adjacent the ends thereof, a pivot pin connected to each of said arms for projecting through said slotted openings whereby said movable member is pivotable about said pin between operative and inoperative positions, each of said side flanges having a cam edge portion traversing an arc through approximately 90°, means forming a positive limit stop at the extremities of said cam arc, said stop means limiting movement of said movable member in the operative position including a projecting lip and cooperating notch extending radially inwardly of said cam arc, said notch being co-axially disposed with respect to said slot, and a depression at the other extreme limit of said camming edge to limit the movable member in inoperative position, a projection extending outwardly of said flange disposed in spaced alignment with said notch, a cooperating notch formed in the edge of said arms to engage said projection in the operative position, a cam follower disposed in alignment with said projection and opposite thereto, said follower riding said cam arc, and a coil spring having one end fixed to said base, and its other end fixed to the web of said movable member, said spring disposed so that the axis of said spring moves through the axis of said pin and slot connection, as the movable member is rotated between operative and inoperative positions, said spring normally biasing said cam follower into lock position or the movable member reaches the limits of said cam.

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